UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NEW ENGLAND
OFFICE OF ECOSYSTEM PROTECTION
ONE CONGRESS STREET
BOSTON, MASSACHUSETTS 02114

FACT SHEET

DRAFT NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT TO DISCHARGE TO WATERS OF THE UNITED STATES

NPDES PERMIT NO.: MA0004898

PUBLIC COMMENT PERIOD:

PUBLIC NOTICE NO.:

NAME AND ADDRESS OF APPLICANT:

Mirant Kendall, L.L.C.
1099 Hingham Street
Rockland, MA 02370

NAME AND ADDRESS OF FACILITY WHERE DISCHARGE OCCURS:

Mirant Kendall Station
265 First Street
Cambridge, MA 02142

RECEIVING WATER: Charles River to Boston Harbor to Massachusetts Bay
USGS Hydrologic code: 01090001
State Basin Code: 70

CLASSIFICATION: Class B - Restrictions: CSO**,** Warm Water

CURRENT PERMIT	**ISSUED:**	August 17, 1988
	EXPIRED:	August 17, 1993
	RE-APPLICATION:	June 14, 1993 (Original) February 2001 (Supplemental)

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1.0 Proposed Action, Type of Facility, and Discharge Location

On June 14, 1993, Commonwealth Electric Company, the former owner of the Kendall Square Station (now Mirant Kendall Station, or the "Facility") applied to the United States Environmental Protection Agency (EPA) for reissuance of its NPDES permit to discharge into the Charles River from the Facility in Cambridge, Massachusetts. On February 14, 2001, the current owner, Mirant Kendall, L.L.C. (Mirant, or the "permittee") supplemented the permit application with a submittal entitled "National Pollutant Discharge Elimination System (NPDES Permit # MA0004898), Kendall Square Station Equipment Upgrade Project, Cambridge, Massachusetts" dated February 2001 (February 2001 Supplemental NPDES Application). This submittal was in response to requests by EPA and the Massachusetts Department of Environmental Protection (MADEP) and presented information regarding the Facility's equipment upgrade project. The permittee has also provided significant amounts of other information in letters and data submittals. Throughout the permit renewal process, there has been extensive communication with the permittee and numerous state and federal agencies regarding the content of this draft.

EPA intends to reissue the Facility's NPDES permit. This draft permit authorizes the discharge of "once-through" cooling water and other waters and this authorization is based on the assumption that the Facility will meet specific in-stream temperature limits and monitoring and reporting requirements in compliance with the Clean Water Act (CWA). The draft NPDES permit has been prepared and should be referred to when reading this fact sheet. The reader may also find it useful to review the permittee's February 2001 Volume I Application, as well as EPA's determination pursuant to CWA Section 316(a) and (b) entitled "Clean Water Act NPDES Permitting Determinations for Thermal Discharge and Cooling Water Intake from Mirant Kendall Power Station in Cambridge, MA" (Determination Document).

In this Fact Sheet and the accompanying Determination Document, EPA invites comment at several points on alternatives to the permitting requirements we are proposing in the Draft Permit. EPA will consider those comments carefully and, depending on what we conclude, we may finalize the permit based on any of the alternatives that are adequately described in this Fact Sheet and the Determination Document. Therefore, the public should consider commenting on both the terms of the draft permit and the alternatives EPA presents.

Under the existing permit, Mirant Kendall Station was a 113 megawatt (MW) per hour fossil fuel electrical generation facility located in Cambridge, Massachusetts. All other power figures are per hour, unless otherwise noted. See **Figure 1** for facility location. The current discharges to the Charles River and Broad Canal consist of once-through non-contact cooling water, service waters (for cooling the generator and circulating pump bushings and bearings, and hogging injector condensers) and intake screen backwash water. The Facility's industrial waste water (including boiler blowdown) and sanitary waste water are discharged to the City of Cambridge sanitary sewer, which is connected to the Massachusetts Water Resources Authority (MWRA) system. Storm water is discharged to the Broad Canal, and a portion of the storm water from rooftop drainage is discharged to the MWRA system.

2.0 Description of Facility, Types of Discharges and Receiving Water

2.1 Pre-Upgrade Facility and Discharges

This Facility underwent an upgrade that was completed in 2002 and early 2003 that is described below. This section describes the operation of the facility before the upgrade. The Facility is engaged in the generation and distribution of electric power. It has five steam-generating boilers fueled by oil and natural gas. The three largest boilers produce steam to generate electricity, and the two significantly smaller units are used to produce back-up steam only. Steam is used to generate electricity and for space heating and various industrial uses in the nearby community. The Facility generates electricity through the use of three steam turbine generators with an average annual net output of 64 MW (67 MW in the winter and 63 MW in the summer). In addition, the Facility operates two jet engine gas turbines, fueled by jet fuel, that generate electricity during peak electrical consumption to provide an additional 46 MW of capacity, with no associated cooling water required. Therefore, during peak electrical consumption (i.e., summer heat waves), the prior Facility provided up to113 MW. From 1988 through 2001, the Facility operated at reduced levels of electrical generation due to its low efficiency and the high cost of fuel (oil and natural gas). It has been operated as a "peaking plant," meaning that it chiefly operated during periods of peak electrical demand.

2.1.1 Cooling Water and Other Discharges and Compliance History

As noted above, the Facility's current discharges to the Charles River and Broad Canal consist of non-contact cooling water, service waters and intake screen backwash water. Industrial and sanitary waste water are discharged to the City of Cambridge sanitary sewer, which is connected to the MWRA system. Storm water is discharged to the Broad Canal, and a portion of the storm water from rooftop drainage is also discharged to the MWRA system.

The Facility's once-through cooling water system is currently permitted to discharge up to a maximum of 80 million gallons per day (MGD) of water to the Charles River, not to exceed a monthly average of 70 MGD. The historical flow of the non-contact cooling water from September 1988 to April 1998 was approximately 50 MGD as a monthly average. The daily maximum flow ranged generally from 50 to 70 MGD through this period as shown from the February 2001 Supplemental NPDES Application, Volume I, Figure 2-7.

Water that is needed to cool and condense steam exiting the turbines is withdrawn from the Broad Canal, a channel connected to the Charles River, through three permitted intake structures. The water is circulated through the Facility's three condensers, where the heat from the condensers is transferred to the water. The maximum permitted increase in water temperature across the condensers is 20^{o} Fahrenheit (F). This is also referred to as the "delta T" limit. The maximum permitted discharge temperature is 105^{o}F. The heated discharge water is returned to the Charles River through two pipes (Outfall Nos. 001 and 002) located on the seawall along the Charles River, directly east of the Facility. The Facility has had the option of discharging the heated effluent to the Broad Canal through two additional pipes (Outfall Nos. 003 and 004) for the purposes of melting ice during the winter; however, since the Broad Canal is no longer used for commercial transportation, these discharge pipes are rarely used now. The Facility also discharges intake screen backwash water to the Broad Canal after removing debris from the three intake screens (Outfall Nos. 005, 006 and 007). See **Figure 2** for outfall locations.

The Facility exceeded the existing permit limit representing the difference between the water intake and water discharge temperature, the "delta T," once during the period of January 1999 to September of 2002 (21^{o}F in September of 2000), with an average delta T of 14^{o}F during this period. The highest recorded discharge temperature during this period was 104^{o}F, with no violations of the existing permit limit of 105^{o}F. The effluent pH has remained within the permitted range of 6.5 to 9.0 standard units. For this same period, the total residual chlorine (TRC) concentration has averaged 0.06 mg/l with no violations of the permitted limit of 0.1 mg/l.
This period reflects the operation of the plant before the upgrade was completed. Compliance data reflecting operation under the upgraded facility will be summarized in Section 2.2 below.

2.1.2 Cooling Water Intake Structures

The cooling water intake structures include a multi-tiered system of screens designed to minimize the amount of debris entering the Facility. The existing intake water velocities vary from approximately 0.57 to 0.76 feet per second (fps) at the intake screens (February 2001 Supplemental NPDES Application [1], Volume I, Page 2-11). There are three intake water screen houses. Six pumps (each capable on average of producing a flow of approximately 13 MGD) are used to control flow of the cooling water through the screen houses and to the condensers, two per screen house and condenser. The Facility does not have variable control speed pumps but rather can regulate flow by turning on or off any sequence of pumps. Each intake structure includes a trash rack and traveling screen. The trash racks are located across the three six by 10 foot inlets along the Broad Canal; their steel bars are spaced three inches apart and collect large debris such as plastic and wood fragments that may be in the intake water.

Located downstream of the trash racks are the traveling screens that intersect each inlet's cross-sectional area. The traveling screens are divided into six foot by one foot panels and are located perpendicular to the flow of the water. The screen mesh size is three-eighth (3/8) of an inch. The traveling screens are rotated three times per day and cleaned with river water that is returned to the Broad Canal (outfall pipes 005, 006 and 007). Any fish or debris caught on the screens is placed in a holding bin. When the proposed barrier nets are put in place as explained below, the traveling screens will not be rotated, unless the proposed barrier nets are not in place or not operating effectively. For the new permit, if the quantity of fish impinged on the screens exceeds the historical amounts recorded at the plant, such incidents shall be reported to EPA and MA DEP as described in the draft permit. Initially, this figure will be set at any impingement incident involving greater than 15 fish, based on BPJ, but this figure may be changed based on the permittee's statistical review of historical impingement at the plant and evidence that another figure is appropriate. Impingement sampling is required as described in Section 14.e.9 of this permit.

To control fouling of the intake water system piping, condensers and associated equipment, sodium hypochlorite is added downstream of each traveling screen located in each screen house during cooling water pump(s) operation. The concentration of residual chlorine in the non-contact cooling water is measured daily about 50 feet downstream of the condensers in an access manhole near the Broad Canal. Results of residual chlorine monitoring are submitted monthly in the discharge monitoring reports (DMRs) to EPA and MA DEP. The residual chlorine limit will remain at 0.1 mg/l based on anti-backsliding, attaining water quality standards and the permittee's demonstrated ability to consistently meet this limit.

2.2 Upgraded Facility and Description of Discharges

2.2.1 Upgraded Facility

Heat Recovery Steam Generator. Since the existing permit was issued, Mirant Kendall has upgraded the existing steam electric power generation facilities at the Facility by adding a new combustion turbine generator -- specifically, a heat recovery steam generator (HRSG) -- and associated air pollution control and air cooling equipment. Natural gas is the primary source of fuel for the HRSG, although low-sulfur distillate oil may be used as a back-up fuel for up to 720 hours per year. The upgraded Facility continues to use the existing steam turbines and generators and plant cooling system. See **Figure 3** for a schematic of the upgraded plant.

The new combustion turbine generator produces approximately 170 MW of power. The total average annual net output of the Facility is now 234 MW. Including the two jet peaking turbines, the Facility is capable of producing up to 283 MW at peak electrical demand, with a 280 MW annual average generation.

Because the Facility is much more energy-efficient in generating electricity, the permittee intends to operate it as a "base-load" plant, meaning that the Facility will operate at a capacity near 234 MW year round (and more at certain times of the year). The difference between previous and current operations is that the Facility will essentially operate continuously at a level that will produce approximately three times the megawatts (without the jet peaking engines) as compared to that from the pre-upgrade Facility produced when it was operating at "peak" load for limited times of the year.

Fin Fan Cooler. To help dissipate heat from the increased heat load of the Facility, Mirant has installed a "fin fan" cooler on the roof of the new combustion turbine/heat recovery steam generation building. The fin fan cooler, an air cooling device, rejects waste heat to the atmosphere and meets the operational cooling needs of the new combustion turbine and associated new auxiliary equipment, such as the fuel gas compressor, without using any additional or existing non-contact cooling water.

2.2.2 Cooling Water and Other Discharges

The discharges to the Charles River from the upgraded Facility will include the once-through condenser cooling water; service waters; boiler blowdown and test water from the HRSG in the upgraded portion of the Facility; residual waste water from a new ultra filter (UF) and reverse osmosis (RO) water treatment system; intake screen backwash water; and all site storm water. The Facility will continue to discharge boiler blowdown to the sewer, but in addition, the HRSG will discharge boiler blowdown and test water to the non-contact cooling water, which in turn discharges to the Charles River. Because the HRSG is a new unit, the draft permit requires monitoring of these new discharges to ensure that pollutants will not be discharged to the Charles River that would cause or contribute to any water quality standard violations.

Ultra Filter and Reverse Osmosis Systems. Mirant is now diverting approximately 4.7 MGD of the non-contact cooling water to produce approximately 1 MGD of purified water using the new UF and RO water treatment system. The purified water is being used in the existing boilers, the evaporative cooler and the turbines as part of the HRSG; for oil burning water injection to reduce nitrogen oxides, power augmentation and production of steam to customers; and as boiler make-up water. The draft permit makes this withdrawal part of and subject to the flow limits at the Facility.

The water to be purified comes from the non-contact cooling water once it has been heated and passed through the condensers. Treatment of this water through the new UF and RO system removes the majority of suspended solids and dissolved solids. The UF and RO system generates an average of 0.9 MGD, and a maximum of 3.73 MGD, of reject water. This reject water will have increased total suspended solids (TSS) and total dissolved solids (TDS) concentrations above the ambient conditions in the Charles River. The reject water from the water treatment system and boiler blowdown and test water will be returned to the non-contact cooling water stream for discharge to the river. Up until this new discharge is authorized by this reissued permit, this flow will be sent to the MWRA sewer.

The boiler blowdown and test water from the HRSG is 14 GPM or 20,160 GPD. After the HRSG boiler blowdown is quenched, the volume of waste water is 35 GPM, or 50,400 GPD. The UF and RO system reject water and the HRSG waste water together will comprise a waste stream that will be considered an internal outfall and designated as Outfall Number 009, so that it will not be diluted with any other water prior to sampling. The estimated maximum flow from internal Outfall Number 009 is 3.73 MGD (letter from Mirant to EPA dated April 24, 2002). To assess the UF and RO reject water and other low-volume wastes such as the boiler blowdown from the HRSG, the draft permit requires the monitoring of these discharges.

Mirant has proposed to install four separate treatment trains for its UF and RO water treatment system. It has indicated that it had installed only three of these units as of September 2002. Therefore, Page 8 of the draft permit authorizes the permittee to discharge through Outfall 009, the effluent from up to four separate treatment trains of the UF and RO system, in anticipation of the eventual installation of a fourth unit.

Storm Water and Other Discharges. All storm water has been re-routed to the stormwater drainage system via sumps with oil traps and storm water treatment modules, which are designed to separate out the majority of oil/grease and sediment from the stormwater before discharge to Broad Canal. All waste streams other than storm water, including service waters, will continue to be discharged to the sanitary sewer. These flows include chemical cleaning wastes (from cleaning the RO system with corrosives), low-volume waste water from floor drains, evaporative cooler blowdown, demineralizer, condensate polisher and sanitary waste water.

Compliance History Since Upgrade. The permittee was operating the plant with the new generator by October of 2002. Since that time, there have been 3 violations of the delta T limit of 21°F, 21°F and 23°F for November 2002, June 2003 and November 2003, respectively. There have been no violations of the maximum effluent temperature, with a high of 103°F since October 2002 through November 2003. There was one TRC violation of 0.14 mg/l in July 2003. There was also one monthly average effluent flow limit violation of 73 MGD, also in July 2003. There were no violations of the pH limits during this period. The effluent flow has averaged 61 MGD for this period, with a high of 79 MGD.

2.2.3 Proposed Cooling Water Intake Structures

Mirant proposes to install fine-mesh exclusion barrier nets with an approach velocity of approximately 0.04 feet per second (fps) in front of the three existing cooling water inlet structures. During the summer of 2000, Mirant placed a prototype barrier in front of Intake Structure No. 3 and conducted studies to assess entrainment and impingement of aquatic organisms. The assessment also evaluated the potential for fouling and net durability. Mirant's studies indicated that on average, the reduced approach velocities experienced with the barrier net reduced impingement and the rate of entrainment (February 2001 Supplemental NPDES Application, Volume II, Appendix 5-12). However, these results were variable and, in some cases, inconclusive.

The anticipated approach velocity of 0.04 fps is more than a tenfold decrease from the current rates at the Facility and is well below the commonly used 0.5 fps guideline for through screen velocity at intake screens. A commonly used guideline for through screen velocity is that the flow should not be greater than 0.5 feet per second (fps) at the intake screens. See 65 Fed. Reg. 49087 (August 10, 2000) (discussion of literature regarding intake flow velocity). In EPA's recent Phase II rule, reducing the maximum through screen velocity to 0.5 fps or less is considered the Best Technology Available (BTA) for minimizing adverse environmental impacts associated with impingement unless any more stringent State laws are applicable, pursuant to 40 CFR §125.94(a)(1)(ii).

The proposed design calls for the barrier net to be anchored to the pilings or other structures in Broad Canal and to the canal bottom with the goal of precluding the bypassing of organisms around and under the barrier nets. See **Figure 4** for the proposed design. The proposed barrier will be constructed of 30% monofilament geotextile fabric with openings expected to be 1/32 inch. Seam connections will be made and reinforced at about every 20 feet. The barrier net panels will be maintained by removal and replacement and/or washing to remove debris and fouling encrustations. If power washing becomes ineffective, the barrier net panels will be removed for cleaning and replaced with standby replacement panels. The permittee is required to have additional nets on standby to replace damaged or otherwise unusable nets and to have impermeable panels to use temporarily when replacing barrier net panels to minimize pass through of intake water.

The permittee proposed having these nets in place during the period of February 15th through November 1st, because it is believed that this period would represent the most likely time that large amounts of resident and anadromous fish may be present and susceptible to impingement and entrainment that would occur without these nets present. If the permittee encounters problems with leaves clogging these nets in October, EPA would consider allowing the barrier nets removal prior to November 1st. In addition, if freezing conditions preclude the net installation by February 15th, then the nets shall be installed as soon as the freezing conditions allow.

As discussed in Chapter 5 of the"Technical Development Document for the Final Regulations Addressing CWIS for New Facilities", it has been found that barrier nets installed at CWIS are generally effective at reducing impingement mortality and entrainment (I/E) of aquatic organisms. Barrier nets, among other technologies, were shown to reduce impingement mortality rates by 70-90% or better. For entrainment, fewer studies were reported in this document, mainly with other types of screening devices. These showed similar reduction rates of mainly 80% and better. As such, EPA would expect that barrier nets to be employed at this facility would likewise be effective at reducing impingement mortality and entrainment. Therefore, EPA has set goals for I/E reduction for this permit along with ongoing reporting and changes as necessary which will lead towards the attainment of these goals. The nets shall be designed to meet these goals. For impingement mortality, this permit sets a goal of a minimum of 80% of impingement mortality reduction as compared to the baseline condition. For entrainment, this permit sets a performance standard of a minimum of 60% entrainment reduction as compared to the baseline condition. Baseline conditions will be derived through adult fish and ichthyoplankton sampling conducted each year by the permittee. It will be assumed that without the barrier net, all organisms sampled in the immediate vicinity of the intake structure would have been impinged or entrained.

In its Annual Monitoring Report (AMR), the permittee will report on how the barrier nets were operating, including what levels I/E reduction were attained. To the extent that the barrier nets fall short of the I/E reduction goals set forth in the permit, the AMR will include measures the permittee proposes to take to improve the barrier net design or use alternative exclusionary devices, which will lead to the attainment of these goals.

As the barrier nets and their associated performance standards for I/E reduction are an important component of the Best Technology Available (BTA) determination for this facility, as explained in the attached Determination Document, it is critical that they are deployed for the entire period noted above. The permit requires that changeover of any nets for cleaning or replacement take place in a way that minimizes any flow through of intake water that does not go through the barrier net for the deployment period. The permittee proposes to accomplish this by placing an impermeable panel behind a barrier net section prior to removing it. The permittee shall remove one barrier net section at a time, since multiple barriers in front of an intake structure would tend to increase the intake velocity through the remaining panels.

If the permittee encounters unforeseen difficulties with the nets, it may pass water through its intakes without the use of nets for a period of time sufficient to alleviate the problem, but not more than 10% of the time that the facility is drawing intake water during any calendar month for all intake structures combined. For any such period that exceeds four hours, the permittee will operate its traveling screens once per eight hour shift until the barrier nets are fully restored.

A comparison of the currently permitted Facility and the upgraded Facility is provided in Table 1.2-1 below.

Table 1.2-1: Comparison of Existing and Proposed Facility Operating Conditions

Prior Facility Operation	Upgraded Facility Operation
3 steam turbine generators produce total of 64 MW (2 small back-up units produce steam only). 2 jet engine gas turbines provide additional 46 MW during peak electrical consumption (units are air cooled) -- total of up to 113 MW.	Existing conditions plus 170 MW combustion turbine – total of up to 283 MW.

Prior Facility Operation	Upgraded Facility Operation
Operates as “peaking” facility for short periods of time.	Operates as “base-load” facility year-round at up to 5 times former heat load.
Daily Average Maximum Flow: 80 MGD	Same
Monthly Average Maximum Flow: 70 MGD	Annual Average Maximum Flow: 70 MGD, measured as 12-month rolling average, except for April through June, when maximum monthly average flow is limited to 70 MGD.
Maximum Daily Discharge Temperature Increase Over Intake Water Temp. = 20ºF	Same
Maximum Daily Discharge Temperature = 105ºF	Same
Total Residual Chlorine = 0.1 mg/l	Same
pH = 6.5 to 9.0; no visible discharge of floating solids	Same
Intake Structures: Trash racks and traveling 3/8 inch mesh screens.	Intake Structures: Small mesh (1/32 in) barrier net installed in front of intake structures and traveling screens to reduce impingement and entrainment of aquatic organisms from February 15 through November 1
Use of approximately 200,000 gallons per day (GPD) of municipal water for potable and sanitary water and boiler make-up and equipment washdown Waste water discharged to MWRA sewer.	Use of approximately 5,000 GPD of municipal water. Up to 4.73 MGD of river water to be treated in ultra-filter and reverse osmosis water treatment system to produce 1 MGD of ultra-clean water for production of steam in existing combustion boilers and steam associated with new combustion turbine generator. Up to 3.73 MGD of reject water from ultra-filter and reverse osmosis system will discharge dissolved solids and suspended solids, chlorine and various chemicals to river. Boiler blowdown and test water from new HRSG discharges to river at rate of 0.02 MGD.
Storm water discharges to river and MWRA sewer	All storm water re-routed to discharge to river.

2.3 Charles River

Mirant Kendall Station is located in Cambridge, Massachusetts, along the shore of the Charles River, approximately one mile upstream from the mouth of the river. The entire Charles River is approximately 80 miles long and flows through eastern Massachusetts. The Facility’s operation is believed to have a significant impact on the water quality and aquatic populations that exist in the Charles River from the mouth of the river upstream to where the river passes Watertown, Massachusetts. This portion of the river is the primary focus of this document. The area, bracketed by the New Charles River Dam at the mouth and the Boston University Bridge upstream, is identified as the lower Charles River Basin. Detailed information about the Charles River may be found in the Determination Document accompanying this fact sheet.

Physical Characteristics of the Charles River Basin. The Charles River Basin encompasses about a nine-mile section of the river, from the Watertown Dam at the upstream boundary of the basin, to the New Charles River Dam near the mouth of the river. For the purposes of this permit, the lower Charles River Basin, or the lower basin, is defined as the area from the Boston University Bridge to the New Charles river Dam. Before construction of the first (Old) Charles River Dam in 1908, the river in this area was a tidal estuary, with exposed mudflats at low tide. The dam, built approximately one mile upstream from the natural mouth of the river, created a freshwater basin in the Charles River with stable water levels. Waters upstream of the dam were removed from the influence of the Boston Harbor tidal cycle of fluctuating water levels and saltwater mixing. In 1978, the New Charles River Dam replaced the original dam. The original dam was not removed from the river. Instead, the navigational lock was modified into a passage canal, with both ends open at all times. The new dam is located approximately one-half mile downstream from the original dam. This dam is presently the physical demarcation between the fresh waters of the Charles River and the coastal marine waters of Boston Harbor. The dam has three navigational locks and was designed with an anadromous fish passage structure, which has never been fully operational.

The Charles River Basin travels in a generally easterly direction before discharging into Boston Harbor. For the majority of the distance from the Watertown Dam downstream, the river is generally about 500 feet wide. The river in this section of the basin meanders and has a measurable flow, generally displaying characteristics that are more closely associated with a riverine habitat. Approximately three miles upstream from the mouth of the river, the basin widens significantly, deepens and has a greatly reduced flow, assuming impoundment-like characteristics. This pronounced change in the basin takes place just downstream from the Boston University Bridge. The mean depth of the basin is approximately 12.5 feet (3.8 meters), with the deepest point being approximately 40 feet deep (12 meters).

The bottom configuration of the wide, impoundment-like portion of the basin varies greatly, having many deep depressions. These depressions have been reported to collect dense, cold water during certain times of the year. The water is low in dissolved oxygen and sometimes high in salinity. The poor water quality in these deep areas has been shown to be difficult to flush out or mix with upper layers of the water column, even under high flow conditions.

The shoreline of the basin is highly developed, with rock walls, concrete retaining walls, docks, marinas, and roadways constructed along the banks. There are eight bridges that cross the river in the lower basin. Several smaller tributaries empty into the lower basin. They include Laundry Brook, Hyde Brook, Faneuil Brook, Shepard Brook, Salt Creek, Muddy River, and Stony Brook.

On the Cambridge (northern drainage) side of the lower basin, the Broad Canal is located just upstream of the Facility. The canal is a man-made inlet originally constructed to encourage business development along the Charles River. The Broad Canal now extends approximately 700 feet perpendicular to the Charles River and is about 15 feet deep. The canal is used as a source of cooling water for the Facility. See February 2001 Supplemental NPDES Application, Volume I.

Watershed Description. The drainage area to the basin, excluding areas above the Watertown Dam, is estimated to be 36.6 square miles, but drainage divides are complicated by man-made drainage systems that are common in the major metropolitan area that encompasses the majority of the watershed. The lower basin watershed is extremely urbanized, with a multiple of commercial, residential, industrial and recreational land uses along both sides of the river (Fiorentino, 2000). Through pavement and other urban development, a large percentage of the land in this watershed has been made impervious to rainfall. Sheet runoff from storm events is carried through a complex infrastructure of pipes and diversionary canals. This characteristic of the watershed causes streamflow in the lower Charles River Watershed to be unsettled and subject to rapidly increased flows in response to rain events (Breault, et al., 2001 draft).

Hydrology. At Kendall Square Station, for the months of May, July and September, the average monthly flows for the period of record (1931 - 1990) were calculated to be 449 cfs, 160 cfs and 140 cfs respectively. These flows were derived by adding 24% to the flows recorded upstream at the USGS gauging station at Waltham, Massachusetts (USGS, 2002) to account for tributary flows to the lower Charles below the gauging station. The 7Q10 flow near the Facility is estimated to be approximately 22 cfs. To put this into perspective with regard to the water use of the Facility, the maximum permitted discharge flow at the Facility is 124 cfs, or 80 MGD. Retention time in the lower basin at the Charles River flow of 25 cfs, which is near the 7Q10 flow of 22 cfs, is estimated to be up to 208 days (Southern Energy, LLC; 2000) and the retention time at the flow of 100 cfs would be up to 52 days.

The New Charles River Dam highly regulates the flow and water level of the basin to control flooding of the surrounding shoreline during storm conditions and prevent dewatering of a large percentage of basin sediment under low flow conditions and low tides in the harbor. Operation of the navigational locks and sluice gates at the New Charles River Dam, especially during high tide in the harbor, when the harbor water level is higher than the Charles River level, has been known to result in the movement of a dense, saline wedge of water from the harbor into the freshwater basin.

Water Quality. Under the state water use classification system, MADEP has designated the lower Charles River basin as a Class B water (314 CMR 4.00). Class B waters are designated as a habitat for fish, other aquatic life, and wildlife and for primary and secondary contact recreation. These waters are to be suitable for public water supply following appropriate treatment, irrigation and other agricultural uses, and compatible industrial cooling and process uses. The waters shall have consistently good aesthetic value.

The basin does not always meet the state water quality standards prescribed for Class B waters, especially after wet weather. See the Determination Document accompanying this fact sheet for more detailed information.

Aquatic Habitat. The lower Charles River Basin has a degraded benthic habitat, primarily due to high concentrations of inorganic and organic contaminants that have been deposited in the basin over many years. Low in-stream velocities and soft substrates are characteristic of the lower basin. In some cases, nuisance algal blooms and high levels of chlorophyll *a* have been reported in the lower basin, as explained in Attachment A of this fact sheet. There are 20 species of fish found in the Charles River, including resident freshwater species such as yellow perch, largemouth bass, chain pickerel and sunfish. Anadromous species, such as blueback herring and alewife, have also been documented in the basin. A listing of finfish priority species compiled by the permittee may be found on Page 5-4 of the February 2001 Supplemental NPDES Application.

Basin Uses. The basin has been used as a transportation corridor, an industrial center and recreational resource. It has served as a sanitary sewer carrying industrial and domestic waste, including raw sewage. At the present time, the basin still acts as the receiving water for nearly 100 outfalls, including over a dozen permitted Combined Sewer Overflows (CSO) discharges. All of the CSO discharges are untreated, with the exception of discharges from the Cottage Farm CSO treatment facility.

Today, the basin is a focal point for recreational activities for surrounding communities. Sailing, kayaking, rowing and power boating are popular in the basin, as well as the recreational use of the parks along the banks. Concerted efforts are underway by surrounding communities, private organizations, businesses, and local, state, and federal agencies to fully restore the lower Charles River Basin to meet all its designated uses. These efforts have made improvements to the river, reflected by 74% of the Charles River now meeting standards for swimming in dry weather (CRWA). An EPA initiative, refered to as “Clean Charles 2005" is under way to restore the basin to “fishable and swimmable” uses by 2005.

In addition, the lower Charles River basin is currently targeted for total maximum daily load (TMDL) development to address water quality impairments associated with excessive algal blooms. The severity of the blooms is attributed primarily to (a) high nutrient loadings from publicly owned treatment works in the upper watershed, discharges from urban storm drainage systems and CSOs, (b) thermal loadings from the Facility, and (c) long retention times. The Charles River Watershed Association has convened a Technical Advisory Committee in support of hydrodynamic and water quality modeling for the development of a nutrient TMDL for the lower basin, and the modeling effort is currently underway. (Draft “Modeling Framework to Support Total Maximum Daily Load (TMDL) Development for the Lower Charles River, Massachusetts” dated December 3, 2002.)

3.0 Limitations and Conditions

The effluent limitations of the draft permit, the monitoring requirements, and any implementation schedule (if required) may be found in the draft permit.

4.0 Permit Basis and Explanation of Effluent Limitations Derivation

4.1 General Requirements

The Clean Water Act (CWA) prohibits the discharge of pollutants to waters of the United States without a National Pollutant Discharge Elimination System (NPDES) permit unless such a discharge is otherwise authorized by the CWA. The NPDES permit is the mechanism used to implement technology and water quality-based effluent limitations and other requirements including monitoring and reporting. This draft NPDES permit was developed in accordance with various statutory and regulatory requirements established pursuant to the CWA and any applicable State regulations. The regulations governing the EPA NPDES permit program are generally found at 40 CFR Parts 122, 124, 125, and 136.

When developing permit limits, EPA must consider the most recent technology-based treatment and water quality-based requirements. Subpart A of 40 CFR Part 125 establishes criteria and standards for the imposition of technology-based treatment requirements in permits under Section 301(b) of the CWA, including the application of EPA-promulgated effluent limitations and case-by-case determinations of effluent limitations under Section 402(a)(1) of the CWA. EPA is required to consider technology and water quality-based requirements as well as all limitations and requirements in the existing permit when developing permit limits.

4.1.1 Technology-Based Requirements

Technology-based treatment requirements represent the minimum level of control that must be imposed under Sections 301(b) and 402 of the CWA (see 40 CFR §125 Subpart A) to meet best practicable control technology currently available (BPT) for conventional pollutants and some metals, best conventional control technology (BCT) for conventional pollutants, and best available technology economically achievable (BAT) for toxic and non-conventional pollutants. Effluent limitations guidelines for the Steam Electric Power Generating Point Source Category are found at 40 CFR Part 423. These guidelines do not include effluent limits on the discharge of heat from steam electric power generating point sources.

In general, the statutory deadline for non-POTW, technology-based effluent limitations must be complied with as expeditiously as practicable but in no case later than three years after the date such limitations are established and in no case later than March 31, 1989 (see 40 CFR §125.3(a)(2)). Compliance schedules and deadlines not in accordance with the statutory provisions of the CWA can not be authorized by a NPDES permit.

In the absence of published technology-based effluent guidelines, the permit writer is authorized under Section 402(a)(1)(B) of the CWA to establish effluent limitations on a case-by-case basis using best professional judgement (BPJ).

The effluent monitoring requirements have been established to yield data representative of the discharges under the authority of Section 308(a) of the Clean Water Act, according to regulations set forth at 40 CFR § 122.41(j), 122.44(i) and 122.48. The monitoring program in the permit specifies routine sampling and analysis which will provide continuous information on the reliability and effectiveness of the installed pollution abatement equipment. The approved analytical procedures are to be found in 40 CFR 136 unless other procedures are explicitly required in the permit.

4.1.2 Water Quality-Based Requirements

Water quality-based limitations are required in NPDES permits when EPA and the State determine that effluent limits more stringent than technology-based limits are necessary to maintain or achieve state or federal water quality standards. See Section 301(b)(1)(C) of the CWA.

Receiving water requirements are established according to numerical and narrative standards adopted under state law for each water quality classification. When using chemical-specific numeric criteria to develop permit limits, both the acute and chronic aquatic-life criteria, expressed in terms of maximum allowable in-stream pollutant concentration, are used. Acute aquatic-life criteria are considered applicable to daily time periods (maximum daily limit) and chronic aquatic-life criteria are considered applicable to monthly time periods (average monthly limit). Chemical-specific limits are allowed under 40 CFR § 122.44(d)(1) and are implemented under 40 CFR § 122.45(d). The Region has established, pursuant to 40 CFR 122.45(d)(2), a maximum daily limit and average monthly discharge limits for specific chemical pollutants.

A facility's design flow is used when deriving constituent limits for daily and monthly time periods as well as weekly periods where appropriate. Also, the dilution provided by the receiving water is factored into this process. Narrative criteria from the state's water quality standards are often used to limit toxicity in discharges where (a) a specific pollutant can be identified as causing or contributing to the toxicity but the state has no numeric standard; or (b) toxicity cannot be traced to a specific pollutant.

EPA regulations require NPDES permits to contain effluent limits more stringent than technology-based limits where more stringent limits are necessary to maintain or achieve state or federal water quality standards. The permit must address any pollutant or pollutant parameter (conventional, non-conventional, toxic and whole effluent toxicity) that is or may be discharged at a level that causes or has "reasonable potential" to cause or contribute to an excursion above any water quality criterion. See 40 CFR Section 122.44(d)(1). An excursion occurs if the projected or actual in-stream concentration exceeds the applicable criterion. In determining reasonable potential, EPA considers (a) existing controls on point and non-point sources of pollution; (b) pollutant concentration and variability in the effluent and receiving water as determined from the permit application, Monthly Discharge Monitoring Reports (DMRs), and State and Federal Water Quality Reports; (c) sensitivity of the species to toxicity testing; (d) known water quality impacts of processes on wastewater; and, where appropriate, (e) dilution of the effluent in the receiving water.

Water quality standards consist of three parts: (a) beneficial designated uses for a water body or a segment of a water body; (b) numeric and/or narrative water quality criteria sufficient to protect the assigned designated use(s); and (c) antidegradation requirements to ensure that once a use is attained it will not be degraded. The Massachusetts Surface Water Quality Standards, found at 314 CMR 4.00, include these elements. The state will limit or prohibit discharges of pollutants to surface waters to assure that surface water quality standards of the receiving waters are protected and maintained or attained. These standards also include requirements for the regulation and control of toxic constituents and require that EPA criteria, established pursuant to Section 304(a) of the CWA, shall be used unless a site-specific criterion is established. The conditions of the permit reflect the goal of the CWA and EPA to achieve and then to maintain water quality standards.

The Charles River and Broad Canal at their points of discharge are classified as Class B warm water fisheries by MADEP. As noted above, Class B waters are designated as a habitat for fish, other aquatic life and wildlife and for primary and secondary contact recreation. These waters shall have consistently good aesthetic value. Where designated, they shall be suitable as a source of public water supply with appropriate treatment (the lower Charles River basin is not a public water source). They shall be suitable for irrigation and other agricultural uses and for compatible industrial cooling and process uses.

4.1.3 Anti-Backsliding

A permit may not be renewed, reissued or modified with less stringent effluent limitations or permit conditions or standards than those contained in the previous permit unless in compliance with the anti-backsliding requirements of the CWA. See Sections 402(o) and 303(d)(4) of the CWA; 40 CFR §122.44(l). EPA's NPDES permitting regulations at 40 CFR § 122.44(l) require that when an NPDES permit is renewed or reissued, the new permit limits, standards or conditions must be at least as stringent as those in the previous permit unless the circumstances on which the previous permit was based have materially and substantially changed since the time the permit was issued and would constitute cause for permit modification or revocation and reissuance under 40 CFR § 122.62.

The existing permit includes a flow limit of 70 MGD as a monthly average. The draft permit changes this 70 MGD monthly average limit to a 70 MGD annual average limit that is to be reported as a rolling monthly annual average and met for every consecutive 12-month period, except in April, May and June, when the permittee must still meet a monthly average limit of 70 MGD. This change could be considered backsliding because it will allow Mirant to increase peak monthly flows to the Charles River to levels approaching the daily maximum limit of 80 MGD. In the months when Mirant is increasing its flows (for periods longer than it would have under peaking plant generation), there will also likely be an increase in the impacts from impingement and entrainment of aquatic life, specifically eggs and small larvae, which are not expected to be excluded by the barrier nets in any appreciable amounts.

Mirant has upgraded the Facility in order to be able to operate it more consistently as a base-load plant. Given the seasonal variations in electricity demand, a monthly compliance period throughout the year would not allow the Facility the flexibility to utilize that enhanced capacity consistently during high demand months. An annual average limit reported for every consecutive 12-month period as a rolling average will allow Mirant to offset high demand months against low demand months. In addition, the permit maintains the requirement of an average monthly limit for flow of 70 MGD for the months of April, May and June, which comprise a critical spawning period for many fish species. EPA believes that the additional measures required in the permit and described in this fact sheet and the accompanying Determination Document will ensure that applicable water quality standards and other requirements, including assuring the protection and propagation of a balanced, indigenous population, are achieved and maintained.

As noted above, 40 CFR § 122.44(l)(1) provides an exception to antibacksliding where the circumstances on which the previous permit was based have materially and substantially changed since the time the permit was issued and would constitute cause for permit modification or revocation and reissuance under 40 CFR § 122.62. EPA believes that the addition of the new combustion turbine generator to the Facility, and the permittee's intention to operate the Facility as a base load plant rather than as a peaking plant, represents such a material and substantial change in circumstances and would constitute cause for permit modification or revocation and reissuance under 40 CFR § 122.62. As a result, we are allowing this relaxation of the averaging period for the 70 MGD flow limit. We anticipate that the numbers of fish and larger larvae that were previously entrained through the plant will be reduced as a result of the installation of barrier nets.

4.1.4 Antidegradation

EPA water quality standard regulations at 40 CFR Section 131.12 require each state to develop and adopt a statewide antidegradation policy that maintains and protects existing instream water uses and the level of water quality necessary to protect the existing uses, and maintains the quality of waters that exceed levels necessary to support propagation of fish, shellfish, and wildlife and to support recreation in and on the water.

314 CMR 4.04 contains the antidegradation provisions of the MSWQS. 314 CMR 4.04(1) requires that "[i]n all cases existing uses and the level of water quality necessary to protect the existing uses shall be protected and maintained." The MA DEP guidance document entitled Antidegradation Review Procedure for Discharge Requiring a Permit Under 314 CMR 3.03 implements the antidegradation provisions of 314 CMR 4.04 by establishing a review process that applies to all applications for a new or increased discharge to the waters of the Commonwealth. With regard to the protection of existing uses, this review process has three steps (i.e., Tier I review): (a) identifying existing uses, (b) predicting impacts on existing uses that may result from lowering of water quality, hydrologic modification or habitat alteration, and

(c) comparing predicted impacts with water quality criteria to determine whether existing uses are supported.

4.1.5 State Certification

Under Section 401 of the CWA, EPA is required to obtain certification from the state in which the discharge is located that all water quality standards or other applicable requirements of state law, in accordance with Section 301(b)(1)(C) of the CWA, are satisfied. EPA permits are to include any conditions required in the state's certification as being necessary to ensure compliance with state water quality standards or other applicable requirements of state law. (See CWA Section 401(a) and 40 CFR §124.53(e).) Regulations governing state certification are set out at 40 CFR §124.53 and §124.55. EPA regulations pertaining to permit limits based upon water quality standards and state requirements are contained in 40 CFR §122.44(d).

4.1.6 CWA Sections 316(a) and (b)

CWA Sections 316 (a) pertaining to thermal discharge and 316(b) pertaining to cooling water intake structure requirements are discussed in Sections 5.1 and 5.2 of this Fact Sheet and analyzed in detail in the Determination Document accompanying this Fact Sheet.

4.2 Facility Information

Kendall Square Station is owned and operated by Mirant Kendall, L.L.C. It has been operating since 1949 and generated up to 113 MW of electricity under the existing permit, which is transmitted through the Independent System Operator (ISO) for the New England states.

The Facility consists of four operational units that combust fossil fuels. The table below describes the three main units and the new unit that was placed in service in 2002.

UNIT	CAPACITY (MEGAWATTS)	START DATE	FUEL
1	19	1949	No.6 fuel oil/ gas
2	21	1951	No.6 fuel oil/ gas
3	27	1957	No.6 fuel oil/ gas
4	175	2002	Natural gas/ kerosene

Specifically, the Facility employs five steam generating boilers, three as the main power boilers and the remaining two boilers for steam backup only. The Facility also has a new combined-cycle unit, Unit 4. Unit 4's gas cycle uses a combustion turbine to produce approximately 170 MW of power, while its steam cycle, which consists of the new HRSG, produces steam to drive the Facility's three existing steam turbine generators, resulting in a more efficiently operating plant. This type of operation is referred to as a "combined cycle". Unit 4 is fired primarily by natural gas. In the eventuality that there is an interruption in the gas supply or if market conditions warrant it, the Facility is able to fire this new unit with a low-sulfur distillate oil (kerosene) for up to 30 days a year, as dictated by the Facility's air emissions permit.

In addition, the Facility has two gas turbines. These are jet engine peaking generators that are currently used during periods of peak electrical consumption; they use jet fuel and combine for a total of 46 MW of power. These two units were placed in service in 1970 and were refurbished in 1994. They use city water but do not discharge waste heat to a receiving water.

Mirant has presented a quantitative description of the current and proposed discharges from the Facility in the February 2001 Supplemental NPDES Application, Tables 2-1 through 2-8, and the April 24, 2002 letter from Mirant to EPA. In addition, it has presented (a) a site plan (February 2001 Supplemental NPDES Application, Figure 1); (b) a schematic drawing of all of the permitted outfalls (February 2001 Supplemental NPDES Application, Figure 2); and (c) a schematic drawing of the flow of water at the Facility and the various discharges from the Facility (February 2001 Supplemental NPDES Application, Figure 2-6).

This draft permit addresses the discharges listed below.

Table 4.2-1: Proposed Operation and Flow Description for Each Outfall Pipe: Serial Numbers 001, 002, 003, 004, 005, 006, 007 and 009

Outfall Pipe(s)	Operation	Discharge Characteristics	
		Average Annual Flow Rate	**Maximum Daily Flow Rate**
Total Combined Outfall Numbers 001, 002, 003, and 004 (all potential cooling water discharge points)	Combined non-contact cooling water and low-volume waste effluent	70 MGD (permit limit is 70 MGD as rolling monthly annual average)*	80 MGD

Outfall Pipe(s)	Operation	Discharge Characteristics	
		Average Annual Flow Rate	Maximum Daily Flow Rate
	Includes River Water Treatment Plant Reject		2,556 gpm
	Includes HRSG Boiler Blowdown (before quenching)		14 gpm
Outfall Number 001 (Seawall in Charles River)	Non-contact cooling water flow rate	35 MGD	40 MGD
	May include River Water Treatment Plant Reject	----	Estimated at 1,278 gpm
	Includes HRSG Boiler Blowdown (before quenching)	----	Estimated at 7 gpm
Outfall Number 002 (Seawall in Charles River)	Non-contact cooling water flow rate	35 MGD	40 MGD
	Includes River Water Treatment Plant Reject	----	Estimated at 1,278 gpm
	Includes HRSG Boiler Blowdown (before quenching)	----	Estimated at 7 gpm
Outfall Number 003 (Broad Canal)	Non-contact cooling water flow rate	35 MGD	40 MGD
	Includes River Water Treatment Plant Reject	----	Estimated at 1,278 gpm
	Includes HRSG Boiler Blowdown (before quenching)	----	Estimated at 7 gpm

Outfall Pipe(s)	Operation	Discharge Characteristics	
		Average Annual Flow Rate	**Maximum Daily Flow Rate**
Outfall Number 004 (Broad Canal)	Non-contact cooling water flow rate	35 MGD	40 MGD
	Includes River Water Treatment Plant Reject	----	Estimated at 1,278 gpm
	Includes HRSG Boiler Blowdown (before quenching)	----	Estimated at 7 gpm
Outfall Number 005	Screen Backwash Water		0.1 MGD
Outfall Number 006	Screen Backwash Water		0.1 MGD
Outfall Number 007	Screen Backwash Water		0.1 MGD
Internal Outfall Number 009 (Non-Contact Cooling Water withdrawn after Condensers and returned to Non-Contact Cooling Water)	UF and RO Reject Water and Other Low Volume Wastes (Boiler Blowdown from HRSG)		Estimated 3.73 MGD

*Except in April, May and June, when maximum monthly average flow is limited to 70 MGD.

In addition, the chemicals that the Facility proposes to use to treat the river water are listed in the table below.

Table 2.1-1: Proposed Water Treatment Chemicals

Chemical Name	What Chemical is Used For	Hazardous Constituents and Chemicals of Concern	Where in Process Used	Approximate Amount Used per Year in gallons	Concentration in Process Equipment	Aquatic Protection Level
Spectrus DT1404/ Sodium Bisulfite	Dechlorination agent	Sodium bisulfite	Prior to UF reject tank and in UF permeate line prior to RO	1,534	10 to 50 ppm	125 ppm as Spectrus
Optisperse HP54439	Reduce boiler iron oxide buildup	None	Boiler Units	3,038	3.2 ppm feed rate	5,000 ppm as Optisperse
Hypersperse MDC150	Reduces scale precipitates and particulate fouling in RO system	None	RO system	1,087	5 ppm constantly in influent to RO system	3,310 ppm as Hypersperse
Steamate NA0240	Condensate system corrosion control	40% morpholine	Boiler Units	1,532	1.5 ppm feed	100 ppm as Steamate
Cortrol OS5607	Boiler oxygen scavenger	Carbonic dihydrazide	Boiler Units	770	Fed at 5 ppb	96 ppm as Cortrol
Sulfuric acid	Neutralization agent	Corrosive	Prior to UF reject tank and prior to mixed bed waste tank	Variable depends on the buffering capacity of the river water	96% sulfuric feed rate a function of the pH	6-9 pH units
Sodium hydroxide	Cleaning agent to reduce fouling	Corrosive	In UF during backwash and prior to mixed bed waste tank	Variable depends on the buffering capacity of the river water	50% sodium hydroxide feed rate a function of pH	6-9 pH units
Sodium hypochlorite	Biocide	Free chlorine	Influent to water treatment prior to UF and in plant intake water	Variable depends on the chlorine demand capacity of the river water	20% solution, UF influent at 1-2 ppm, and 35-50 ppm in backflush. Also fed though each intake at a rate of 0.1 ppm free product to control biofouling	0.1 ppm free chlorine

Source: Letters from Mirant to EPA dated April 11, 2002 and April 24, 2002 .

4.3 Current and Draft Permit Effluent Limitation Requirements

The BPT and BAT technology-based effluent limitations guidelines for the steam electric power generating point source category at 40 CFR Part 423 provide the basis for certain of the effluent limitations in the draft permit. These effluent limitations guidelines require that each identified waste stream meet the effluent limitations prior to dilution. See 40 CFR § 423.12(b)(12) (BPT); 40 CFR § 423.13(h) (BAT). To satisfy these requirements, the draft permit requires internal monitoring and limitations for the non-contact cooling water, the process waters associated with the UF and RO systems, and low-volume wastes.

4.4 Once-Through Cooling Water (Outfalls 001, 002, 003 and 004)

4.4.1 Flow

The Facility relies on once-through cooling water to condense steam and remove waste heat from the condensers. Six pumps are used to control flow of the cooling water to the condensers, two per condenser. Each pump, on average, is capable of pumping approximately 13 MGD. Mirant does not have variable control speed pumps but rather can regulate flow by turning any sequence of pumps on or off. With all of the pumps operating, the maximum flow rate is about 77 MGD.

The daily maximum flow limit of 80 MGD from the existing permit is carried forward in the draft permit.

With regard to average flow rate, the existing permit expresses the flow limit of 70 MGD as a monthly average. The draft permit changes this 70 MGD monthly average limit to a 70 MGD annual average limit that is to be reported as a rolling monthly annual average and met for every consecutive 12-month period (except in April, May and June, when the permittee must still meet a monthly average limit of 70 MGD). This change could be considered backsliding because it will allow Mirant to increase peak monthly flows to the Charles River to levels approaching the maximum daily flow limit of 80 MGD. The actual flow of once through cooling water will increase above the historical flow (which was approximately 50 MGD between 1999 and 2001) to a level approaching the permit limits because of the Facility upgrades and the anticipated continuous operation of the Facility. In the months when Mirant is increasing its flows (for periods longer than it would have under peaking plant generation), there will also be an increase in the potential impacts of impingement and entrainment of aquatic life, specifically for eggs and smaller larvae, which are not expected to be excluded in any appreciable amounts by a barrier net system similar to that which was pilot tested by the permittee.

As noted above, 40 CFR § 122.44(l)(1) provides an exception to antibacksliding where the circumstances on which the previous permit was based have materially and substantially changed since the time the permit was issued and would constitute cause for permit modification or revocation and reissuance under 40 CFR § 122.62. EPA believes that the addition of the new combustion turbine generator to the Facility, and the permittee’s intention to operate the Facility as a base load plant rather than as a peaking plant, represents such a material and substantial change in circumstances and would constitute cause for permit modification or revocation and reissuance under 40 CFR § 122.62. We are allowing this relaxation of the averaging period for the 70 MGD flow limit on the condition that the permittee must comply with the monitoring requirements, attain the in-stream conditions established in the draft permit, and meet the 70 MGD limit on a rolling monthly basis over every 12 calendar month period.

Mirant has upgraded the Facility in order to be able to operate it more consistently as a base-load generator. Given the seasonal variations in electricity demand, a monthly compliance period throughout the year would not allow the Facility the flexibility to utilize that enhanced capacity consistently during high demand months. An annual average limit reported for every consecutive 12-month period as a rolling average will allow Mirant to offset high demand months against low demand months. In addition, the permit maintains the requirement of an average monthly limit for flow of 70 MGD for the months of April, May and June, which comprise a critical spawning period for many fish species. EPA believes that the additional measures required in the permit and described in this fact sheet and the accompanying determination document will ensure that applicable water quality standards and other requirements, including assuring the protection and propagation of a balanced, indigenous population, are achieved and maintained.

4.4.2 Chlorine

The draft permit retains the existing permit's limitation on the total residual chlorine (TRC) concentration in the once through cooling water of 0.1 mg/l.

As water is pumped through the condenser tubes, it picks up heat and increases in temperature. Chlorine is added at the intake structures for no more than two hours per day for each condenser and intake structure in order to keep the condenser tubes and other heat transfer surfaces clean and thus provide efficient heat transfer rates. The existing permit limits the daily maximum TRC concentration for the non-contact cooling water to 0.1 mg/l.

EPA has established a best technology available economically achievable (BAT) limit of 0.2 mg/l for TRC in once through cooling water for plants with a total rated capacity of 25 MW or greater. This requirement is found at 40 CFR 423.13(b). However, EPA is retaining the 0.1 mg/l TRC limit in the draft permit for the reasons explained below. In addition, the technology-based effluent guidelines at 40 CFR Part 423 require that the waste streams for each condenser be controlled on an individual basis. As in the existing permit, the draft permit allows a maximum chlorination time of two hours per day for each unit, and prohibits simultaneous multi-unit chlorination. The flow rate limitation for each individual unit controls the mass of chlorine discharged.

The maximum daily TRC limitation of 0.1 mg/l in the once through cooling water discharge is being retained in the draft permit under the anti-backsliding provisions of the CWA and to assure that water quality standards are met. The permittee samples TRC in the discharge pipe, near Broad Canal. Mirant has concluded that "[o]verall, river chlorine concentrations from the Facility discharge would decline below present levels as a result of splitting the discharge flow between the current wall and future diffuser locations" (letter from Mirant to EPA dated December 6, 2001.) Although EPA has concerns regarding the model that Mirant used to simulate future river temperatures and concentrations, the Agency believes that the residual chlorine concentrations in the Charles River should be below acute and chronic levels at most times. These levels are 19 ug/l and 11 ug/l, respectively. These concentrations may exceed the chronic limit when the river is approaching 7Q10 flow conditions, but these exceedances are expected to be short-term and are typically allowed in the mixing zone, consistent with MSWQS. However, this draft permit is not authorizing the use of an outfall diffuser. Therefore, in order to assure that nothing beyond periodic violations of chronic instream TRC levels occur, instream TRC sampling will be required monthly at three (3) locations in the lower basin as described in

Section 14.d.3. of the draft permit.

With its December 6, 2001 letter, Mirant submitted modeling data showing in-stream residual chlorine levels at various points near the discharge that were all below the in-stream acute and chronic water quality levels for chlorine. This modeling was conducted with river flows of 57 and 92 cfs. Because the 7Q10 flow of the Charles River at the Facility location is roughly 22 cfs, EPA is assuming that modeling in-stream TRC concentrations at the 7Q10 flow could result in some excursions of the chronic water quality standard for TRC.

Although a formal mixing zone has not been established for this discharge, we are using this mixing zone concept for the purposes of this discussion. MADEP has generally required the lower value of 0.1 mg/l to be used for steam electric power generating facilities, in order to protect the mixing zone from violations of chronic and acute TRC levels. . The basis of this limit is discussed in a document entitled “Thermal Pollution Control in Massachusetts Coastal Waters” (Massachusetts Water Resources Commission, January 1973). This document explains how the limit of 0.1 mg/l of TRC was established for the permit for the Canal Electric plant in Sandwich, Massachusetts. Bioassays performed on menhaden fish showed a TL_m of 0.7 mg/l for TRC; one-tenth of this figure, or 0.07 mg/l, was used to be protective, and this 0.07 figure was then rounded up to 0.1 mg/l to derive a “practical measurable limit.” The TL_m was a measure of toxic effect to the menhaden. Since the Canal Electric permit, MADEP has routinely used the 0.1 mg/l TRC limit for other power plant discharges in Massachusetts (Paul Hogan, MADEP; personal communication). Therefore, the TRC limit will remain at 0.1 mg/l based on anti-backsliding and consistent with the MADEP’s mixing zone policy which allows for limited excursions of the chronic TRC limit within the mixing zone as provided in SectionVI.C of “Massachusetts Water Quality Standards, Implementation Policy for the Control of Toxic Pollutants in Surface Waters”, February 23, 1990 .

4.4.3 Thermal Discharge

All of the non-contact cooling water used in the operation of this Facility is discharged via up to four different outfalls to the Charles River or Broad Canal, Outfall numbers 001, 002, 003 and 004. Depending on the ambient temperatures in the Charles River and the potential affect on the Facility’s discharge on those temperatures, the permittee will divert flow to the various outfall pipes and/or curtail thermal output to meet the temperature limits in the Charles River specified in Attachment A of the draft permit.

Outfalls 003 and 004 were historically used to heat the Broad Canal waters during the winter months to prevent the canal from freezing over. It is anticipated that Outfalls 003 and 004 will not be used frequently in the future. The majority of the non-contact cooling water will be directed to Outfalls 001 and 002.

Since the temperature and flow rate of the non-contact cooling water affects the temperature and potentially the eutrophication level of lower Charles River basin, it is necessary to limit the discharge from the Facility's Outfalls (001, 002, 003 and 004) to ensure that water quality standards, including water quality standards related to eutrophication standards are not violated (see Section 5.0 and Attachment A of this Fact Sheet) and that instream temperatures are consistent with the CWA §316(a) variance (see Section 6.1 of this Fact Sheet and the Determination Document). This Section 316(a) variance allows the discharge of heat in excess of water quality-based temperature limitations. Furthermore, EPA's determination regarding the Best Technology Available (BTA) for minimizing adverse environmental impacts from the cooling water intake structure (CWIS) of each condenser unit, pursuant to CWA §316(b), is set out in Section 6.2 of this Fact Sheet and in the Determination Document.

As explained in Sections 5.6 and 5.7 of the Demonstration Document, protective temperature limits and time periods for the most sensitive resident and anadromous species were combined and organized by month, beginning in January, to obtain an overall picture of the instream temperatures necessary for the protection and propagation of the balanced, indigenous population of shellfish, fish and wildlife in and on the receiving water body (BIP). These thermal limits, based on the thermal tolerances of the fish species of the Charles River Basin and derived from a variety of literature sources and instream data are established for the Zone of Passage and Habitat (ZPH), an area of habitat in the lower basin deemed sufficient to protect the species occurring there and to allow the propagation of balanced biological communities. Compliance with these limits will be verified through an real-time, continuous water quality monitoring program mentioned earlier. These temperature limits are provided in Attachment A of the permit.

Percentage Of Habitat Where Thermal Limits Must Apply

The thermal limits identified for the most sensitive resident and anadromous species, based on the biology of the fish species present in the lower Charles River Basin, are established to maintain aquatic habitat in the lower basin that is deemed sufficient to protect these species and allow the propagation of the balanced indigenous populations (BIPs). It is desirable that the maximum volume of the basin practicable should maintain temperatures at or below the protective thermal limits. Since Kendall Station operation may not allow 100 % of the lower Basin to meet these protective temperatures, a minimum volume of the basin was identified where protective thermal limits must not be exceeded in order to protect the BIP. A fundamental component of any protective management plan is to maintain a sufficient avenue or zone in the water body with a suitable habitat to allow the migration or free movement of fish or other aquatic life. In consultation with the agencies noted above in the permit evaluation, EPA and DEP have determined that sound environmental management directs that a minimum of 50% of the lower basin, measured at any cross section from the Zone Boundary Transect, (a transect just just upstream of the Longfellow Bridge), to the New Charles River Dam and Locks, would be a prudent minimum area where the protective thermal limits of the permit must be maintained. The Zone Boundary Transect was identified by the permittee as the location in the basin of the upstream edge of a proposed zone of mixing (Mirant Kendall, February, 2001).

In order to achieve the requirement of a prudent minimum area where the protective limits must be maintained, a minimum of 50% of any cross sectional, bank-to-bank area of the lower Charles River Basin must meet the protective thermal limits. While there is some flexibility regarding the shape of the protected area, it must always include certain monitoring points considered important for habitat protection and representative of the bounds of this area, as shown in Draft Permit Attachment D. Therefore, temperatures at these monitoring points must be at or below the protective water temperature limits stated in the permit. When, as a minimum, this much of the aquatic habitat meets the biologically based thermal limits, it is judged that the BIP will be protected. This thermally protected portion of the aquatic habitat is referred to as the Zone of Passage and Habitat (ZPH) and is formally defined as the contiguous volume of the lower Charles River Basin where water temperatures are at or below the thermal limits in effect on a particular day, while also meeting criteria of the State Water Quality Standards (e.g. dissolved oxygen $\geq$ 5 mg/l). The lower Basin must always maintain a thermally protected ZPH that will never make up less than 50% of the volume of the lower Charles River Basin, from the Zone Boundary Transect to the New Charles River Lock and Dam, to support the protection and propagation of the BIP.

Stated another way, the permit allows up to 50% of the cross section of the lower Charles River Basin, from the Zone Boundary Transect to the New Charles River Dam and Locks, to reach temperatures which could cause an avoidance reaction, a reduction in growth or reproductive potential, or even death to aquatic life, as long as a certain near-surface section of the Boston side meet protective temperatures. Further, the monitoring points that verify that 50% of the cross section meet the temperature limits must be contiguous.

Vital habitat that has been identified as part of the near surface water column must not be entirely eliminated from the ZPH by allowing less dense, higher temperature water to “float” in a layer on the surface and occur from bank to bank for long periods of time. To ensure these near surface water layers do not consistently maintain temperature readings above protective limits, the two (2) foot depth water quality Monitoring Point at Station 3 (closest to the Boston shore), as well as the six (6) foot depth water quality Monitoring Points at both Station 3 and Station 4, must meet the temperature limit established for the ZPH for that time period, regardless of the size of the ZPH. This requirement will be in effect throughout the time period that anadromous fish are present in the lower basin, which is believed to be from April 15 through October 31.

Resident species of the lower basin also occur throughout the water column and must be guaranteed access to near surface waters in the ZPH. To ensure at least a part of the upper water column does not thermally exclude resident species, the temperature readings of the two (2) foot depth water quality Monitoring Point at Station 3 (closest to the Boston shore) must meet the temperature limit established for the ZPH for that time period, regardless of the size of the ZPH. This requirement will be in effect to ensure that resident species are not completely excluded from the near surface waters by high water temperatures from November 1 through April 14.

Conversely, a Zone of Dilution (ZD) will also be allowed in the lower Charles River Basin as part of the thermal variance. The ZD is defined as the volume of the lower basin where biologically based, protective water temperatures are exceeded. At no time will the ZD take up more than 50% of the volume of the lower basin from the Zone Boundary Transect to the New Charles River Lock and Dam . Verification of the 50% minimum volume requirement of the ZPH, will be achieved through an in-situ, real-time, continuous water quality monitoring program, using fixed monitoring stations positioned at several key locations in the receiving waters of the lower Basin. An array of temperature and dissolved oxygen monitors, evenly spaced vertically and horizontally along the cross sectional area of the lower basin transect determined likely to be most influenced by the thermal plume from the Kendall Station, will be a compliance transect which will document that the ZPH characterizes a minimum of 50% of the river. If at least half of the Monitoring Points along this transect (In-Zone Transect) meet the maximum temperature limit, and these points are all adjacent to each other, then at least 50% of the cross-section of the river at this transect will meet the ZPH characteristics. In this case, monitoring points are considered adjacent or contiguous to one another if they are not separated by a monitoring point that does not meet the thermal limit in effect. Specific information regarding the placement of the in-situ, real-time monitors in the lower basin is included in Section 5.10 of the Determination Document. A detailed narrative of how the temperature limits are applied to the lower basin is included in Attachment A of the permit.

Delta T requirements:

The Massachusetts State Water Quality Standards set a maximum delta T of 2.8ºC (5º F) for Class B warm water fisheries. This delta T is considered a change in temperature from ambient instream conditions. EPA has interpreted the maximum delta T of 2.8ºC (5º F) to apply when comparing ambient water temperature conditions in the lower Charles River Basin with temperatures in the ZPH. Establishing a delta T of 2.8ºC (5º F) in the ZPH, in addition to the maximum temperature limits established above, will protect the BIP in the lower basin from thermal stress as the fish move through these elevated temperatures in the ZPH.

Monitoring Points at a depth of 2 foot and 6 foot will be averaged at Station 1, over a 24 hour block period (00:00 [midnight] to 23:59), and compared with the 2 foot and 6 foot depth average of each Monitoring Point in the ZPH , over the same 24 hour block period (00:00 [midnight] to 23:59), to determine Delta T compliance. The Delta T limit must be met at a minimum, at Monitoring Stations 2 and 3, Monitoring Station 4 (if both the 2 foot and the 6 foot depths are included in the ZPH), and Monitoring Stations 7 and 8.

Permitted Allowances For Elevated Ambient Temperatures

This will provide the permittee the option of using up to six (6), non-consecutive day opportunities each year, from April 15 through June 7, to add up to 1.1ºC (2 ºF) over ambient conditions to the ZPH, once the ambient temperature of the basin has reached or exceeded the temperature limit in effect. To ensure that all six (6) days are not used within a brief time frame, only three (3) exceedances will be allowed in any four week period**.** Unused days will not be carried over to future years. Once the six days have been used, the permittee will not be allowed to add any additional heatload to the ZPH above ambient water temperature, as long as the ambient water temperature is at or above the temperature limit in effect at that time. Because these observed ambient temperature spikes are generally short in duration, allowing a reduced ΔT of 1.1 ºC (2 ºF) in the ZPH (rather than the ΔT of 2.8 ºC (5ºF) usually in effect) will provide the permittee some operational flexibility without having a serious negative effect on the aquatic community.

Alternative proposal to instream temperature limits

The permittee has proposed a BTU heat load proposal as an alternative to meeting the instream temperature limits described in this section. In this alternative proposal, the permittee would be allowed to operate the plant in a way that requires cutting back on electricity generation as a permit condition to ensure instream delta T limits and certain instream temperature thresholds are not exceeded. This approach would provide the permittee with the flexibility it needs to be able to forecast a minimum guaranteed amount of electricity the company can submit as a bid to the administrator of power distribution in the area. This proposal has been modified from the permittee's original submittal and is being offered for public comment and is explained in more detail in **Section 5.11.3** of the Determination Document.

4.5 Low Volume Waste Sources – UF & RO Water Treatment System Reject Waters and HRSG Boiler Blowdown and Test Water (Internal Outfall 009)

High-quality water is required for the high-pressure, high-temperature, boiler-turbine-condenser thermodynamic cycle. The initial filling and subsequent makeup of water to the new HRSG boiler will use the water from the UF and RO system. Small amounts of chemicals, in the parts per million (ppm) range, will be added to inhibit corrosion and scale formation (See Permit Table 1). In general, the chemicals to be used will be phosphate-based polymer for pH control, chlorine, and oxygen scavengers for corrosion control. In spite of the high purity of this water, minute losses of water will occur over time and the small amounts of corrosion products that form in the cycle will tend to build up in time. To maintain peak efficiency, these corrosion by-products and other contaminants will need to be continuously purged by discharging a small flow of water, known as boiler blowdown, from the boiler drum. The existing boiler blowdown and test water from the existing boilers will continue to be discharged to the MWRA sewer. However, the boiler blowdown and test water from the new HRSG will be discharged to the Charles River. In its NPDES Application (Table 2-7) Mirant Kendall submitted test results of the water quality of the blowdown from the existing boilers, which appear typical of these discharges.

The concentrated waste stream created from cleaning and periodic maintenance of the RO and UF system will be discharged to the MWRA sewer via the RO permeate storage tank, mixed bed exchanger, mixed bed waste tank, UF permeate tank, UF/RO cleaning and the existing neutralization system. The waste water not going to the MWRA sewer will be returned to the Charles River via the non-contact cooling water. In sum, as a result of the UF & RO water purification process and HRSG boiler blowdown and test water, dissolved solids and suspended solids as well as chlorine and other residual chemicals used in the UF & RO system and HRSG boiler will be discharged to the Charles River. EPA is requiring that this effluent be monitored in an internal outfall specified as 009 in order to assess the characteristics of this stream. This water will be sampled prior to mixing with any other stream. The draft permit sets the maximum daily flow rate for this low volume waste stream at 3.73 MGD.

Both the HRSG boiler blowdown and test water and the waste streams from the UF & RO system are discharged under the category of "low volume waste sources", in accordance with the BPT requirements found at 40 CFR 423.12(b)(3). For low volume waste sources, the parameters limited in the draft permit are total suspended solids and oil and grease. The limits for total suspended solids are a maximum for any one day of 100 mg/l and a 30-day average not to exceed 30 mg/l. The limits for oil and grease are a maximum for any one day of 20 mg/l and a 30 day average not to exceed 15 mg/l. This permit also established a daily reporting requirement for TRC, for when these systems are operating, which is expected to be on a continuous basis, and being chlorinated.

Because the HRSG boiler blowdown and test water and UF and RO reject water have never been sampled and analyzed, EPA is requiring these waste streams to be tested pursuant to CWA § 308(a)(4)(A) in this permit. Section 308(a) of the Clean Water Act, 33 U.S.C. §1318(a), authorizes EPA to require any person to provide information needed to reissue a NPDES permit. Accordingly, EPA is requiring these analyses to establish whether any limits are required under 40 CFR 122.44(d)(1)(i). The analyses shall be performed on the HRSG boiler blowdown and test water and on the reject waters discharged to the Charles River from the UF and RO water treatment system. The analyses to be conducted are for the 126 priority pollutants identified in 40 CFR Part 423, Appendix A. This testing will be conducted on these new discharges within 60 days after the effective date of the permit and annually thereafter when the chemicals listed in Permit Table 1 are being used in typical dosages.

4.6 Intake Screen Backwash Water (Outfalls 005, 006, and 007)

Intake screen backwashing will periodically be conducted at the facility, but this practice is expected to occur infrequently when the proposed barrier nets are installed. When the proposed barrier nets are in place between February 15 and November 1 and operating properly, the permittee does not expect the need to rotate or backwash the traveling screens. This time period is believed to encompass the spawning seasons of all major indigenous fish species that may be present in the lower Charles River basin.

The screen backwash systems clean the traveling screens. The screens are currently rotated three times per day and backwashed with river water. The screen backwash system consists of water pumped from the river at a rate of 200 gpm that is directed to the screen in one of the three screen houses or intake structures. Each discharge outfall (005, 006 and 007) has a permit limit of 0.1 MGD. With the use of the barrier nets, discharges arising from backwashing the screens should be considerably less than 0.1 MGD. The draft permit requires that all solid material and fish caught on the screens be captured in a bucket and not be discarded back into the river, unless the fish or other organisms are still alive. Some of these fish shall be enumerated for impingement monitoring sampling as described in the permit. All solid material should be disposed of pursuant to local and state waste disposal regulations or ordinances. The permit will require an accounting of all the organisms that are impinged on barrier nets or intake screens in excess of typical or historical amounts.

The permit does not allow the addition of heat to this backwash stream. Since the debris from the screens is collected and the water comes directly from and is subsequently returned to the Broad Canal, there are no other limitations on the intake screen backwash water.

4.7 Other Waste Streams

This draft permit does not authorize the discharge of storm water for any industrial activity occurring on the Facility property. Mirant Kendall has coverage for storm water under EPA's Storm Water Multi-Sector General Permit for Industrial Activities, permit #MAR05B926. Figure 2-23 of the February 2001 Supplemental NPDES Application delineates the storm water drainage patterns of the site. As proposed, the storm water flows on the northern side of the property will be discharged to the MWRA and those on the southern side will be discharged through several locations into the Broad Canal.

All other waste waters produced from the operation of the Facility will be discharged to the MWRA sanitary sewer as previously described.

4.8 Whole Effluent Toxicity Testing

Since the specific chemical characteristics of the proposed HRSG boiler blowdown and the UF & RO water treatment plant reject water discharges are not known, EPA is requiring whole effluent toxicity testing be conducted on the non-contact cooling water after it has mixed with the internal outfall 009 effluent containing these discharges. These discharges typically contain certain levels of metals and other pollutants that individually could result in toxic effects to aquatic life. However, it is not possible to make a credible determination about whether their combination and subsequent dilution with other internal streams would result in toxic effects once instream.

EPA's Technical Support Document for Water Quality-Based Toxics Control, March 1991, EPA/505/2-90-001, recommends using an "integrated strategy" containing both pollutant-specific (chemical) approaches and whole effluent (biological) toxicity approaches to better detect toxics in effluent discharges. Pollutant-specific approaches, such as those in EPA's Gold Book (ambient water quality criteria) and state regulations, address individual chemicals, whereas whole effluent toxicity approaches evaluate interactions between pollutants, i.e., the "additivity", "antagonistic" and/or "synergistic" effects of pollutants. In addition, the presence of an unknown toxic pollutant can be discovered and addressed through this process.

Section 101(a)(3) of the CWA specifically prohibits the discharge of toxic pollutants in toxic amounts, as do Massachusetts Surface Water Quality Standards, which state, in part that "all surface waters shall be free from pollutants in concentrations or combinations that are toxic to humans, aquatic life or wildlife." The NPDES regulations at 40 CFR §122.44(d)(1)(v) require whole effluent toxicity (WET) limits in a permit when a discharge has a "reasonable potential" to cause or contribute to an instream excursion above the State's narrative criterion for toxicity.

Region I adopted this "integrated strategy" on July 1, 1991, for use in permit development and issuance. EPA Region I modified this strategy to protect aquatic life and human health in a manner that is cost-effective as well as environmentally protective.

The Facility discharges wastewater that has an unknown potential for causing toxicity to organisms, especially from the UF and RO water treatment reject water and the HRSG boiler blowdown. Presently, there is inadequate information for EPA to base a "reasonable potential" determination concerning this discharge's toxicity potential to cause or contribute to an excursion of the Commonwealth's narrative water quality criterion. Thus, an inclusion of a WET testing monitoring requirement in the draft permit is necessary, reasonable and appropriate in order to gather this information and make a technically-based "reasonable potential" determination regarding whether or not this discharger is unknowingly contributing toxics to the receiving water. This approach is consistent with that recommended in Technical Support Document for Water Quality-based Toxics Control, March 1991, EPA/505/2-90-001, p. 60.

This WET test is a proactive method of protecting the environment so as to properly carry out EPA's Congressional mandate to prevent the discharge of toxic substances into the Nation's waterways. For EPA to make a "reasonable potential" determination on this discharge, it has been determined that WET tests should be conducted and their results be evaluated.

Therefore, the draft permit requires the permittee to report the results of chronic (and modified acute) WET tests using the freshwater species Daphnid, Ceriodaphnia dubia in the survival and reproduction test and the Fathead Minnow, Pimephales promelas in the larval growth and survival test on a quarterly basis. A 24-hour composite sample is the required "sample type" for WET testing.

Although there a seasonal salt wedge present in the lower Charles Basin, fish surveys in this area have shown the dominant species are freshwater types. The anadromous and catadromous species are present primarily in the spring at the time of higher river flows and therefore reduced salinity. The salinity in the lower section of the lower Charles River, coupled with low dissolved oxygen (DO), is believed to result in a much reduced benthic habitat This area is primarily dominated by freshwater species and those areas where the salt wedge is prevalent are characterized by low DO. They are for the most part avoided by finfish and support a greatly diminished benthic community. Therefore, we believe that the use of freshwater species for WET testing is warranted.

See Attachment D, Toxicity Test Procedure and Protocol, of the draft permit for the complete testing requirements. The toxicity tests shall be performed at times when various chemicals are in use at the facility listed previously in Table 1 of the permit. At a minimum, EPA is requiring the following toxicity testing schedule. These tests shall be performed once per calendar quarter and samples taken during normal operating conditions.

Day 1	**Day 3**	**Day 5**
(Acute and sample #1 for chronic)	**(sample #2 for chronic)**	**(sample #3 for chronic)**
Discharge of Sodium Bisulfite *	HRSG Blowdown	HRSG Blowdown
HRSG Blowdown	UF and RO Water Treatment Reject Water	UF and RO Water Treatment Reject Water
UF and RO Water Treatment Reject Water		

After submitting one year and a minimum of four consecutive sets of WET test results, the permittee may request a reduction or elimination of the WET testing requirements, based upon their results. The permittee is required to continue testing at the frequency specified in the permit until notice is received by certified mail from the EPA that the WET testing requirement has been changed.

If these WET tests indicate persistent toxicity, the Regional Administrator and the Commissioner may decide to modify the permit. Such modifications may include toxicity limits and/or additional pollutant limits to adequately protect the receiving water quality during the remainder of the permit. Results of these toxicity tests will be considered "new information not available at the time of permit development;" therefore, the permitting authority is allowed to use this information to modify an issued permit under the authority described in 40 CFR §122.62(a)(2).

5.0 Eutrophication and Related Aquatic Life/Aesthetic Impairments

See fact sheet Attachment A entitled “Requirements to Address Water Quality Impacts in the Charles River Due to Excessive Algae Growth”.

6.0 Section 316 of the Clean Water Act

With any NPDES permit issuance or reissuance, EPA is required to evaluate or reevaluate compliance with applicable standards, including the standards in Section 316(a) of the CWA regarding thermal discharges, and Section 316(b) of the CWA regarding cooling water intake structures (CWIS). CWA Section 316(a) allows for variance-based effluent limitations for thermal discharges if certain conditions are met. If the applicant demonstrates to the satisfaction of EPA (or, if appropriate, the state) that the alternative effluent limitations proposed will assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on the receiving water body, then the permitting authority may issue the permit with such alternative limitations. CWA Section 316(b) governs cooling water intake requirements and applies where a permit applicant seeks to withdraw cooling water from the waters of the United States. To satisfy Section 316(b), the location, design, construction, and capacity of the facility's CWIS must reflect the Best Technology Available (BTA) for minimizing adverse environmental impacts.

Both Section 316(a) and Section 316(b) of the CWA apply to this permit. Section 316(a) applies because the permittee is requesting a variance to allow proposed thermal discharges that are anticipated to be in excess of what is allowed under state water quality standards. Section 316(b) applies because the Facility includes and operates CWIS.

EPA's determinations and supporting evaluations under CWA Sections 316(a) and (b) for the Kendall Square Station NPDES permit are contained in EPA's document entitled "Clean Water Act NPDES Permitting Determinations for Thermal Discharge and Cooling Water Intake from Mirant Kendall Power Station in Cambridge, MA". The reader should refer to this document for the biological, engineering, legal and policy analyses upon which EPA's final determinations are based. Because this document is quite voluminous, in this Fact Sheet we will only briefly describe the results of these analyses and determinations. However, this document, also referred to as the "Determination Document" is part of the administrative record for the NPDES permit and is available to the public. A brief summary of the conclusions is presented below.

6.1 Section 316(a)

In developing effluent limitations, EPA is to determine technology-based and water quality-based requirements, and whichever is more stringent governs the permit requirements. For thermal discharges, however, EPA may also consider granting a variance under Section 316(a) (as codified at 40 CFR Part 125, Subpart H) from either or both the technology-based and water quality-based effluent limitations if the permittee can demonstrate that less stringent variance-based limitations will nevertheless be sufficient to "assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife" (BIP) in and on the water body receiving the discharge. This demonstration must show that the alternative effluent limitations desired by the permittee, considering the cumulative impact of its thermal discharge together with all other significant impacts on the species affected, will assure the protection and propagation of the BIP. As a practical matter, EPA has with some permits simply developed permit limitations under a Section 316(a) variance if a set of limitations were determined to be sufficient to assure protection and propagation of the BIP. In such cases, determining the technology-based and water quality-based limitations would have served no practical purpose. Similarly, in some cases, EPA has determined water quality-based conditions without determining the technology-based requirements, when we had reason to believe that it was clear that the water quality-based requirements would be more stringent than the technology-based standards.

In this case, the permittee has submitted a 316(a) variance request that included legal, biological, financial and technical information. EPA has reviewed this information, as well as other available information. On the basis of EPA's review, the draft permit retains the variance-based maximum daily discharge temperature limit of 105°F from the existing permit and allows a variance-based ΔT of greater than 5°F in the Zone of Dilution (ZD). In order to assure the protection and propagation of the BIP and to determine whether the permittee continues to meet the standards for this variance, the permit requires compliance with in-stream temperature limits and the maintenance of a ΔT of no greater than 5°F between ZPH temperatures and ambient (i.e., background) in-stream river temperatures.

See the accompanying Determination Document for a detailed discussion of how these permit limits were derived.

6.2 CWA § 316(b)

CWA § 316(b) requires that the capacity, location, design and construction of cooling water intake structures reflect the Best Technology Available (BTA) for minimizing adverse environmental impacts. Impingement and Entrainment (I&E) and of aquatic life are two of the key adverse environmental impacts associated with cooling water intake structure operations.

On February 16, 2004 EPA signed Notice of Final Regulations to Establish Requirements for

Cooling Water Intake Structures at Phase II Existing Facilities. The final regulation is effective 60 days after the date of publication in the Federal Register, which has not occurred as of the date of this writing. Until the new Phase II Regulations are effective, EPA continues the longstanding practice of applying §316(b) on a case-by-case basis to existing facilities.

The different technological alternatives presented by the permittee and discussed in Section 8 of the Determination Document achieve different levels of reductions in adverse environmental impacts. EPA considered whether to include the finfan cooler for the new turbine generating unit as being one component of BTA for dissipating the heat generated by the operation of the new generator. However, since the use of this cooler does not reduce the existing heat load, it was determined not to be a component of BTA for 316(b) for the purposes of the cooling water intake serving the existing boilers, although it helps to avoid increasing the intake levels to cool the new generator.

As discussed in Sections 7 and 8 of the Determination Document, EPA has determined that (1) the installation of barrier nets in front of each of the three intake structures which meet performance standards for reducing impingement mortality, entrainment and intake through screen velocity, (2) the restriction of non-contact cooling water flow to a monthly average rate of 70 MGD during each of the primary spawning months of April, May and June and (3) maintaining the location of the intake structures in the Broad Canal are components of BTA for this facility. See the accompanying Determination Document for the BTA discussion and for an explanation of how the new Phase II rule for 316(b) was used in making this determination.

7.0 Monitoring Plan

Section 14 of the permit outlines the water quality and biological monitoring program that the permittee must conduct through the life of this permit. This monitoring is being required in part to determine compliance with the permit and in part to support the goals of the permit and to better assess the Facility's thermal effects and effects related to impingement and entrainment of aquatic life. The results of this monitoring will be utilized along with effluent monitoring data and other information to determine whether the permittee is meeting water quality standards and whether protection and propagation of the BIP is being assured. Many portions of this Monitoring Plan were derived from the suggestions made by the permittee in its letter of September 13, 2001 from Norm Cowden of Mirant to Mike Hill of the EPA.

There will be continuous monitoring of instream temperatures and dissolved oxygen at several upstream and downstream sites along the Charles River. These data will be used to determine whether the permittee is meeting the instream temperature limits that have been established in the permit. In conjunction with this continuous monitoring, the permittee shall collect certain meteorological data that may affect water quality. These data may be used to determine whether there were meteorological factors that may have contributed to unusual monitoring results or permit violations. As mentioned at the outset of this fact sheet, we are inviting public comment on the contents of this Monitoring Plan, including proposals for alternate monitoring methods for dissolved oxygen (DO).

In addition, the permittee will be required to conduct periodic contour mapping monitoring to get an overall picture of water quality in the area of the lower Charles River basin from the BU Bridge to the New Charles River Dam.

The draft permit also contains a series of biological monitoring requirements. The goals and objectives of this biological monitoring include (1) to expand the baseline biological studies, conducted in 1999, 2000, 2002 and 2003 by the permittee, including the fish sonic tagging studies, (2) to identify any changes in fish populations and migration patterns resulting from Facility operation; (3) to define the extent of habitat and tolerance temperatures for yellow perch; (4) to determine the efficiency of the fine mesh barrier surrounding the Facility water intakes; (5)

to refine the understanding of the timing of and temperatures associated with the Charles River anadromous fish runs; and (6) to refine the understanding of the occurrence and nature of nuisance phytoplankton blooms.

8.0 Essential Fish Habitat Determination (EFH):

Under the 1996 Amendments (PL 104-267) to the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. § 1801 et seq. (1998)), EPA is required to consult with the National Marine Fisheries Services (NMFS) if EPA's action or proposed actions that it funds, permits, or undertakes, may adversely impact any essential fish habitat such as: waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (16 U.S.C. § 1802 (10)). Adversely impact means any impact which reduces the quality and/or quantity of EFH (50 C.F.R. § 600.910 (a)). Adverse effects may include direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey, reduction in species' fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

Essential fish habitat is only designated for species for which federal fisheries management plans exist (16 U.S.C. § 1855(b) (1) (A)). EFH designations for New England were approved by the U.S. Department of Commerce on March 3, 1999. The following is a list of the EFH species and applicable lifestage(s) for the area that includes Massachusetts Bay, Boston Harbor and the Charles River:

Species	Eggs	Larvae	Juveniles	Adults
Atlantic cod (*Gadus morhua*)	X	X	X	X
haddock (*Melanogrammus aeglefinus*)	X	X		
pollock (*Pollachius virens*)	X	X	X	X
whiting (*Merluccius bilinearis*)	X	X	X	X
red hake (*Urophycis chuss*)	X	X	X	X
white hake (*Urophycis tenuis*)	X	X	X	X
winter flounder (*Pseudopleuronectes americanus*)	X	X	X	X
yellowtail flounder (*Pleuronectes ferruginea*)	X	X	X	X
windowpane flounder (*Scopthalmus aquosus*)	X	X	X	X
American plaice (*Hippoglossoides platessoides*)	X	X	X	X
ocean pout (*Macrozoarces americanus*)	X	X	X	X
Atlantic halibut (*Hippoglossus hippoglossus*)	X	X	X	X

Atlantic sea scallop (*Placopecten magellanicus*)	X	X	X	X
Atlantic sea herring (*Clupea harengus*)		X	X	X
long finned squid (*Loligo pealei*)	n/a	n/a	X	X
short finned squid (*Illex illecebrosus*)	n/a	n/a	X	X
Atlantic butterfish (*Peprilus triacanthus*)	X	X	X	X
Atlantic mackerel (*Scomber scombrus*)	X	X	X	X
summer flounder (*Paralicthys dentatus*)				X
scup (*Stenotomus chrysops*)	n/a	n/a	X	X
black sea bass (*Centropristus striata*)	n/a		X	X
surf clam (*Spisula solidissima*)	n/a	n/a	X	X
bluefin tuna (*Thunnus thynnus*)			X	X

A review of the 23 species revealed that the life stages of concern are present in the seawater salinity zone (salinity > 25.0 parts per thousand) or the mixing water /brackish salinity zone (0.5 < salinity < 25.0 parts per thousand) only. No life stage is identified as inhabiting the tidal freshwater salinity zone. The freshwater of the Charles River does not experience appreciable mixing with the saline Boston Harbor water, due to the location of New Charles River Dam and Locks at the mouth of the river. This dam highly regulates the river level and flow of the Charles River, resulting in the river possessing the characteristics of the freshwater salinity zone.

In addition, during four years of adult and juvenile fish sampling as well as extensive ichthyoplankton collection in the Charles River (1999, 2000, 2002 and 2003; Mirant Kendall Reports), none of the 23 species listed in Attachment I have been collected.

Based on the freshwater characteristic of the river and the absence of any of the species listed in Attachment I, EPA has determined that the operation of Mirant Kendall Station does not have a direct adverse effect on the EFH species of concern.

However, EPA recognizes that Station operation has the potential to indirectly cause adverse effects to EFH species in Boston Harbor or Massachusetts Bay. The Station is located on the Cambridge side of the Charles River, approximately one mile upstream of the New Charles River Dam and Locks. Anadromous species that enter the Charles River and move past the Station to spawn upstream may be affected by the thermal plume or the cooling water intake operation at the Station, or both. These species, (blueback herring and alewife), while not identified as EFH species, may be selected as prey by EFH species. If these prey species are effected by Station operation, this has the potential to indirectly affect EFH species through loss of prey.

NOAA Fisheries representatives were part of a multi-agency technical team which contributed to a process to identify NPDES permit limits for Kendall Station that would be protective of fish populations in the Charles River. Through informal discussion, a preliminary assumption of the technical team was that the creation of a permit with limits deemed protective of fish populations in the Charles River would also likely satisfy EFH concerns.

Sections 5.6, 5.7, and 5.8 of the MKS Determination Document describe the instream temperature limits and a zone of passage requirement designed to protect resident and anadromous fish species. These conditions are believed to be protective of anadromous and resident fish species.

Based on the available information, EPA feels that Station operation, as restricted by the draft permit conditions, will not directly or indirectly cause adverse effects to EFH species, because the draft permit contains limits that are protective of the Balanced Indigenous Population (BIP) in the Charles River.

9.0 State Certification Requirements

EPA may not issue a permit unless the DEP certifies that the effluent limitations contained in the permit are stringent enough to assure that the discharge will not cause the receiving water to violate state WQS. EPA has requested permit certification by the state pursuant to 40 CFR 124.53 and expects that the draft permit will be certified.

10.0 Public Comment Period and Procedures for Final Decision

All persons, including applicants, who believe any condition of the draft permit is inappropriate must raise all issues and submit all available arguments and all supporting material for their arguments in full by the close of the public comment period, to the U.S. EPA, Office of Ecosystem Protection (Mailcode SPA), 1 Congress Street, Suite 1100, Boston, Massachusetts 02114-2023. Any person, prior to such date, may submit a request in writing for a public hearing to consider the draft permit to EPA and the state agency. Such requests shall state the nature of the issues proposed to be raised in the hearing. A public hearing may be held after at least thirty days public notice whenever the Regional Administrator or his designee finds that response to this notice indicates significant public interest. In reaching a final decision on the draft permit the Regional Administrator or his designee will respond to all significant comments and make these responses available to the public at EPA's Boston office.

Following the close of the comment period, and after a public hearing, if such hearing is held, the Regional Administrator or his designee will issue a final permit decision and forward a copy of the final decision to the applicant and each person who has submitted written comments or requested notice.

11.0 EPA and DEP Contacts

Additional information concerning the draft permit may be obtained between the hours of 9:00 a.m. and 5:00 p.m., Monday through Friday, excluding holidays, from the EPA and DEP contacts below:

George Papadopoulos, Massachusetts Office of Ecosystem Protection
One Congress Street - Suite 1100 - Mailcode CPE
Boston, MA 02114-2023
Telephone: (617) 918-1579 FAX: (617) 918-1505

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12.0 References

Breault, R.F., J.R. Sorenson, and P.K. Weiskel. 2002. Streamflow, water quality, and contaminant loads in the Lower Charles River Watershed, Massachusetts, 1999-2000. USGS, Northbrough, Massachusetts, WRIR 02-4137.

Charles River Watershed Association, Draft "Modeling Framework to Support Total Maximum Daily Load (TMDL) Development for the Lower Charles River, Massachusetts", December 3, 2002.

Cowden, N., 4/11/02 Letter to Micheal Hill, EPA. Water Treatment System Details

Cowden, N., 12/6/01 Letter to Michael Hill, EPA. Residual Chlorine Analysis.

Cowden, N., 4/24/02 Letter to Michael Hill, EPA. Water Treatment System Details–

Correction to Error in Calculations of TSS.

Cowden, N., 9/13/01 Letter to Michael Hill, EPA

Elwood, J.R. January 1973. Thermal Pollution Control in Massachusetts Coastal Waters. MWRC, Div. of Water Pollution Control, Pub. No. 6505.

Fiorentino, J.F., L.E. Kennedy, and M.J. Weinstein. February 2000. Charles River Watershed 1997/1998 water quality assessment report, Charles River (Segment MA72-08). MA DEP, DWM, Report No. 72-AC-3.

MADEP, "Massachusetts Water Quality Standards, Implementation Policy for the Control of Toxic Pollutants in Surface Waters", February 23, 1990.

Mirant Kendall, L.L.C. February 2001. NPDES Permit # MA0004898 Kendall Square Station Equipment Upgrade Project, Cambridge, MA, Volumes I and II. Prepared by TRC for Mirant Corporation

Southern Energy Kendall, Final Environmental Impact Report, prepared by TRC, May, 2000

USEPA, Preamble to the Proposed CWA § 316(b) Rule (Federal Register, Volume 66, No.243, December 18, 2001)

USEPA, Technical Support Document for Water Quality-based Toxics Control, March 1991, EPA/505/2-90-001, p. 60

USGS, Water Resources Data, Massachusetts and Rhode Island, Water Year 2002.